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NOTES

HUCHINS' GOOSE.—Following Macoun's 'Catalogue of Canadian Birds' I have applied the above name to the small goose, superficially resembling *canadensis*, which is met with during migration in Manitoba. It averages five and a half pounds in weight as against ten pounds in the Canada Goose and measures about 28 inches in length. Its notes are much shriller than those of *canadensis*.

SANDHILL CRANE.—Doubtless records of the Little Brown Crane are mixed with these but specimens collected all appear to belong to the larger species as they weighed twelve or more pounds.

RED-TAILED HAWK.—Two races occur in Manitoba but I have not been able to distinguish them in flight.

ROUGH-LEGGED HAWK.—I have included both *lagopus sancti-johannis* and *ferrugineus* under this name being unable to accurately separate them in migration. The latter breeds in the vicinity.

Prairie Horned Larks and Lapland Longspurs occasionally remain throughout the winter. There are two distinct migratory periods of the latter, indicating that two races are involved.

In the fall migration records birds known to be, or suspected of being belated due to lack of migratory instinct have been omitted.

Treesbank, Manitoba

SEXUAL SELECTION AND BIRD SONG.

BY CHAUNCEY J. HAWKINS.

IN an article I wrote for 'The Auk' for October, 1918, on 'Sexual Selection and Bird Song,' the objection was raised against my position that, while my argument made "it seem very probable that bird-song had its origin—its first cause—in the 'maleness' of the males," I failed to show how "the multiplicity of songs of the various species of birds, the extremely elaborate songs of some, could have acquired their present forms except by some continuous selective process." The criticism was perfectly just and my only reply to it is that in the article I was not dealing with this phase of the question. If I succeeded in establishing the fact that bird-song had its origin in the maleness of the males, I feel confident that I laid the foundation for a more reasonable theory of how bird-songs, with their great variety, acquired their present forms than is found in the commonly accepted sexual selection theory.

The entire discussion of this complex problem rests upon a question which I have never seen adequately treated in connection with the sexual selection theory of the origin of bird-songs, namely, whether the evolution of subspecies, varying from the species type, was made from a single individual or from a number of individuals? Upon the settlement of this question rests the truth or the fallacy of the claims of those who have supported the sexual selection theory. If the variation which has resulted in subspecies has come from a single individual then there is a background of fact upon which the Darwinian disciples may build, but if the subspecies came through the variation of a group of individuals it is difficult to conceive how their arguments can be maintained.

Morgan in his 'Evolution and Adaptation' states the case in a clear and forceful manner: "If amongst the descendants of a single individual a new form or a number of new forms were to arise, then, if they represented only a variety, they would cross with the other forms like the parent species; and, under these conditions, it is generally assumed that the new variety would be swamped . . . If, however, a number of new forms appeared at the same time and left a number of descendants, then the probability that the new group might perpetuate itself is greater, and the chance that such a group would arise is in proportion to the number of individuals that vary in the same direction simultaneously. In this case the new species has not come from a single individual or even from a pair of individuals, but from a number of individuals that have varied more or less in the same direction."

This latter theory of evolution is true to most of the facts as we know them at the present time in the bird world. There is scarcely a species of birds in eastern North America in which there are not individual birds which show some slight variations from the type but these variations are lost in the descendants of these birds. Every field student has observed individual Song Sparrows which have had some markings which distinguish them from other members of the species found in a given locality, yet these individual variations are not perpetuated. The Song Sparrows have certainly been in eastern North America long enough to produce a number of subspecies if these subspecies could evolve out of

modifications in single birds. The facts seem to be that all of these color changes have been swamped in the life of the species which remains constant to that form which in the far past evolved from its antitype.

On the other hand the genus *Passerella* in western North America appears to be in a very unstable situation. One writer has given us nineteen subspecies of this genus. Ridgway confines *P. iliaca unalaschensis* to Alaska and separates it from the form that comes to northern California as *townsendi*. A variety found on Kadiak Island and wintering south to California, he calls *insularis*. The back of this bird he describes as a warm sepia brown, the spots on the breast larger and a deeper brown, and the tail feathers strongly tipped with buff. *P. i. annectens* is similar to *insularis* but smaller, especially the bill, while the color is slightly browner. It is found in Alaska from Cross Sound to Prince William Sound and winters south to California. *P. i. meruloides* is also similar to *insularis* but smaller and the coloration throughout is darker. *P. i. townsendi* is like *annectens* but the color is darker and the spots on the chest are larger. It breeds on the coast of southern Alaska and winters to northern California. *P. i. fuliginosa* is like *townsendi* but is darker and the spots on the under parts are larger and more confluent.

We recognize that the classification of the subspecies of *Passerella* is still to be finally determined but enough has been done to enable us to recognize definite geographical limits to many of these varieties. It is evident that something is taking place in the western Fox Sparrow which is not occurring in his eastern relative. In the west there is not merely a single individual branching from the parent type but, under the influence of climate, and other undetermined factors, large numbers of individuals of a species are departing from the type. In the east a variation may occur now and then in an individual but it is lost in succeeding generations, while in the west where the variation occurs in a group of birds it survives with the result that a new subspecies evolves.

It is also a recognized fact that many variations of both plants and animals will continue so long as these animals or plants remain under given climatic conditions but if removed to a different climate they will revert to their original type. There are other

plants and animals whose variations have become fixed and they will remain constant though removed to a different climate. This would seem to indicate that in the latter class, when a group of individuals begins to interbreed, "their descendants come to have, after a time, the common blood, so to speak, of all the new forms. If with each union there is a blending of the substances of the individuals, there will result in the end a common substance representing the commingled racial germ-plasm."

When one turns to a study of the songs of birds he finds the same general principle which he discovers in the study of plumage. There are many variations in the songs of our common eastern Song Sparrow. The late John Burroughs said: "I stood one day by a trout stream and suspended my fishing for several minutes to watch a Song Sparrow that was singing on a dry limb before me. He had five distinct songs, which he repeated one after the other. He may have had a sixth or seventh, but he bethought himself of some business in the next field and flew away before he had exhausted his repertory." I was abroad in the fields early one spring when a song came floating over the meadow that was new to my ear. Had some bird strayed from its usual course of migration? This was the first thought that came to my mind. I soon located the song, coming from a clump of alders growing by the side of an old stone wall. It had some suggestion of the notes of a Red-wing. There were many of them about the meadow. This might be a Red-wing improving his song. I approached quietly until the singer was in plain sight,—a common Song Sparrow. His first two notes were more suggestive of our Red-wing than any imitation I had ever heard but at the end of these first notes came a broken, imperfect trill, too low to be heard at a distance. I listened to the bird for a long time and could watch his motions. He was having difficulty in getting out this song. It did not come as easily as his native one and, as I listened, I could not resist the conviction that the bird was trying to imitate the songs of the Red-wings which were coming from different parts of the meadow.

While these observations are interesting they are rare exceptions and the outstanding fact is that these exceptions are not perpetuated in the life of the species nor in subspecies. They are lost with the individuals.

But when we turn from the study of individuals to the group of individuals which has assumed the rank of subspecies then divergences are perpetuated. Unless one listened closely to some of the western chickadees he might think a visitor from Maine had taken a vacation in the west. Whether one is listening to the Mountain Chickadee, the Chestnut-backed or the Long-tailed he can never fail to recognize the chickadee note, pointing to a common ancestry, yet in every one of these species or subspecies of the chickadee there is some slight difference from all the other species or subspecies and this difference, however slight, belongs to all the members of the localized group. It has become a song variation that is passed from generation to generation.

On one journey which covered the states of New England, the southwest, the Pacific Coast, Utah, Idaho, and Montana, I had the privilege of listening to several thrashers. In Arizona I found Bendire's Thrasher, a bird which belongs to the flat country and is more silent than most of its kin. But one morning it mounted the top of a desert bush and poured forth its splendid song. There was no mistaking it for a thrasher song, yet there was something about it that was different from all the others. On the hot sands of southern California I came upon Leconte's Thrasher sitting on the top branch of a small tree and fairly splitting its throat in a song which made me think of the Brown Thrasher singing in the top of an elm tree in Massachusetts yet there was something which was distinctive of this species of birds. Wherever a variation appears in a single individual in its song that variation seems to vanish in its offspring but wherever there is a variation which is common to a group of individuals that variation appears to survive in succeeding generations.

If this is the true biological background of the origin of species and subspecies, even of genera and families, then we pass to an examination of the arguments used in the sexual selection theory. The fact upon which this theory stands or falls is the choice, conscious or unconscious, on the part of the female bird of the most strikingly colored or the best singer among the males. It is our judgment that this choice has never been proven. On the other hand, we believe from observation of bird life that whenever any male bird, be he the least gifted singer of his species, approaches a female at

the hour of her sexual ripeness and succeeds in breaking down her reluctance there is a mating. But for the sake of argument, let us admit that the female does choose the best singer and the most brilliantly colored bird. Her choice must be of an individual bird, say a male Song Sparrow who sings better and is more attractively colored than any other member of his species who has made advances toward this female. This choice, however, is no aid to our sexual selection theory unless these advantages are repeated in the offspring of this union. If they are repeated, then there must be a starting point of a new branch which culminates, at least, in a new subspecies, and there must be as many subspecies started as there are matings with distinctively varied birds. This however does not appear to be the fact. There has been no such breaking up of the species of Song Sparrows in eastern North America. The song type of the species remains constant in the east as does also the plumage.

Indeed, if there actually occurred in any species what can be the only logical conclusion from the premises of the friends of the sexual selection theory, would there be anything left of species? Would not each pair of birds which had mated, provided they possessed any individuality either in song or plumage, be a starting point for a new group of individuals? In a little while the individuals, each differing from all others, would be more common than the species type. This may seem like an attempt to reduce the whole argument to an absurdity, yet we confess that it appears to be the logical conclusion from the fundamental postulates. The weakness of the whole argument is found in the fact that it rests upon a single individual rather than upon a group of individuals.

Turning from the negative to the positive side of this discussion, it remains for us to show how the diversity of bird songs arose out of the maleness of the male. The most powerful factor in the growth of bird-song, so far as external conditions are concerned, is not imitation but isolation. Imitation is the conservative factor in the elaboration of songs rather than the radical factor which it has too often been considered. It has been used too often as a means of showing how birds, imitating the songs of other birds, have copied some of their notes and incorporated them into

their phrasings. Indeed, a great deal of emphasis has been placed on those rare instances where birds have been taken from their nests at an early stage of their development and kept with different species so they have never learned their own song but that of the bird with which they associated. But these are such exceptional cases, always artificial, and often so poorly authenticated, that they have little importance. The chief thing about imitation is that the nestlings learn to sing by imitating the parent birds and are thus from the earliest days bound to the song type of their kind. Thus imitation becomes a tremendously conservative force in the normal course of nature, tending to keep the offspring true to the type instead of leading them toward diversity in song.

Isolation from the main body of the species is the chief factor in the creation of subspecies. *Melospiza* pushes into the northwestern part of the United States, and, isolated by mountain ranges, under the influence of a moisture-laden atmosphere, evolves into *rufina*. But, while climate is working its color miracles, isolation is also having its effect upon the song of the birds. If a man goes to a country where the people speak a language unlike his own, say Spanish, he not only acquires a new tongue, but, through long years of isolation, from those who speak his language, he find there is some modification in his native speech. When he returns to his native land, he discovers that he has unconsciously acquired a slight difference in accent and modulation. May not something like this happen through generations of bird-song? As some of the Song Sparrows became separated from their species there arose, through the mere fact of isolation, a slight difference both in tonality and phrasing until these became acquired characteristics and remained permanent. This, I believe is a fact in the building of bird songs which has not been given sufficient weight. Imitation tends constantly to bind the song to the original type of the species but isolation weakens this conservative factor and permits divergence.

It is true that taken alone this fact of isolation is not sufficient to account for the wide variations and the amazing complexity of songs. It is probably a very slight factor in the total process. Mr. Allen writing in 'The Auk' for October, 1919, says: "Is it not reasonable to assume that courtship excitement should lead to a

more and more elaborate form of song-expression as the development of the species goes on, and that the song of the more excited moments should always be somewhat in advance of the ordinary song in point of fervor and elaboration? This view of the development of bird-song might be stated as follows: Let S represent the song first developed out of the call-notes of a certain species. S becomes elaborated as SS under stress of unusual emotion, and SS becoming fixed in the psychology of the species, the bird has two songs, S and SS, the latter a special mating-song uttered at times of only great sexual excitement; then SS tends to become the ordinary song, and a further elaboration, SSS, is evolved to express the unusual emotion for which SS is no longer adequate."

This statement, when taken by itself, seems to be in perfect accord with the facts. It is only when "courtship excitement" is interpreted in terms of the choice of a particular male by the female and that the song SS or SSS is perpetuated as a result of their mating that the theory passes beyond what the facts warrant. "Courtship excitement" is something which grows out of the inner life of the bird, however much it may be stimulated by external conditions. When the sex glands ripen and the hormones are set free the whole nervous system of the bird is stimulated. Then the bird, so to speak, is "beside himself." There is that within him which is driving him to surpass himself. To resort to a homely illustration, no man who loved his sweetheart was ever able to put into words how much he loved her. There is something within him which urges him to a pitch which exceeds his vocabulary. No song was ever adequate to express all that he felt. The inner urge is forcing him to outdo himself. Is not the same thing true in the bird? The entire nervous system, wrought to the highest pitch under the influence of that which has been set free by the sex glands, is ever trying to exceed itself. The bird's song cannot give adequate expression to the inner feeling. That inner drive is ever urging it to do something better. Indulging in a wild dance, the sex stimulation urges it to a wilder dance. Singing at its best, the "craziness" of the bird compels it to sing a better song. This is not only true of the individual; it is true of every individual of a species or a subspecies. Thus the improvement, whether it be in the dance or the song, is not made in one bird but

in a group of birds. The whole species or subspecies is moving upward and the improvement, coming to a group of individuals, may be passed to the offspring, probably through the conservative factor of imitation.

It may be that the song of a species is built out of its call-notes, yet, if our position is true, it is not done in any patchwork fashion. Back of its present call-notes there were more primitive beginnings, the hiss or the grunt, and back of the hiss or the grunt there were those voiceless days when birds, or their ancestors, tried to express their inner life in motion or dance. But the inner sex life had to find expression and the expression was always inadequate to the inner feeling. The creature was always trying to outdo itself and in this attempt is found the primary cause both for variety in song and dance.

If this is the correct view of this difficult question, it is no more amazing that there should be such a variety of bird-songs than that there should be such a variety of colors in birds. This theory seems to simplify the whole process. I am satisfied that we shall never escape the chaos in which we find ourselves at present so long as we continue the attempt to show how bird-songs have grown through mimicry or imitation or through sexual selection. The whole problem is simplified and placed on an understandable basis when we consider song as a growth under the inner urge of the bird, through sexual excitation, to outdo itself and thus see the song of the bird ever pushing out from crude beginnings to something more complex.

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